

## A NEW SPECIES OF THRAUSTOTHECA

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*Thraustotheca achlyoides* n. sp.

### PLATE 8

Growth very vigorous but slow, the largest threads sometimes reaching a diameter of  $150\mu$  near the base, long, straight or sinuous, rarely or not at all branched. Sporangia formed as in *Achlya* or *Saprolegnia*, of equal or greater diameter than the threads which bear them, not tapering, but often of irregular thickness throughout their length, the tips rounded; the early sporangia straight or with slightly curved tips, the later ones almost invariably with recurved ends. Spores formed as in *T. clavata*, *Achlya*, etc., but discharged by the breaking away of a considerable part of the end of the sporangium, caused by the swelling of an apical group of spores, after which the spores may emerge immediately or may come to rest to emerge several days later. Usually a few seconds after the cracking of the sporangium the spores of the tip ooze out in a group exactly as in *Thraustotheca*. The spores next below this apical group now swell, extending somewhat the truncated tip of the sporangium and after a few seconds begin to move out in their turn. This continues in a series of partial discharges involving a few layers of spores each time until in about five to ten minutes all the spores become loosened and most of them discharged from the sporangium tip where they are spread out in a loose irregular colony. A few spores are always left in the sporangia. The spores encyst in irregular, not spherical, forms before emerging, and are not connected by threads as in *Achlya*, but exhibit a distinct mutual attraction while emerging as shown for *Dictyuchus* by Weston (Ann. Bot. 32: 155. 1918). They slide over each other and shift their relative positions but always keep in contact with the emerging mass. Spores usually emerging from their cysts immediately upon discharge, some of them coming out of their cysts even while being pushed from the sporangium. The emergence from the cysts is much more rapid than in *Achlya* or *Saprolegnia*, occupying only about ten seconds. Gemmae not observed. Oogonia formed rarely under laboratory conditions, spherical or slightly ob-

long, 55-100 $\mu$  thick with smooth walls, borne on lateral stalks which in length are from once to twice the diameter of the oogonia; oogonial stalks usually once coiled, not rarely straight. Eggs 1-8 in an oogonium, 42-60 $\mu$  thick, rarely up to 77 $\mu$  thick, but when so large always single in the oogonium; often crowded and elliptical from pressure; structure as in *A. apiculata* with a central sphere of protoplasm surrounded by oil droplets; wall of the egg about 4 $\mu$  thick. Antheridia apparently not always developed, but when visibly present quite often arising from the oogonial stalk, not rarely declinous, one to several on an oogonium; antheridial tubes developed.

Found twice at Chapel Hill, from Battle's Branch (October, 1922) and from the branch below Cobb Terrace (November, 1922). The description is made and all figures except No. 10 are drawn from a single spore culture of the last collection. This remarkable plant differs from all other water molds in the details of spore behavior and discharge, but the essentials of this process are like those in *Thraustotheca* and it is best to consider it a species of that genus. In *Thraustotheca* it has not been noted that the spores swell locally in a certain area of the sporangium, but it seems to me probable that this is the case. It is certainly so to a marked degree in the peculiar, intermediate species, *Achlya dubia* Coker (Saprolegniaceae, p. 135. 1923). The angular shape of the encysted spores is also a *Thraustotheca* character and is a result of the early encystment while still under compression in the sporangium.

It is very probable that some mucus material is the cause of the extension of the spores though no one has yet been able to demonstrate it. The discovery of the species *Achlya dubia* has already broken down any sharp distinction between *Achlya* and *Thraustotheca*, as some of its sporangia behave as in *Achlya* and others as in *Thraustotheca*. The present species makes a distinction still more difficult by introducing a new combination of features, an elongated, subcylindrical sporangium becoming truncated by the separation of a cap and the spores escaping by slow degrees in angular shapes after encystment. In order to include the present species and exclude *Achlya dubia* the genus may be defined as similar to *Achlya* except that the spores encyst in an angular shape in the sporangia and in all or most cases escape by slow degrees by oozing out after the cracking of the sporangium, in no case escaping promptly through an apical papilla. It is unfortunate that the egg structure in the two species of *Thraus-*

*totheca* is not the same and indicates no closer relationship than in different groups of *Achlya*. In its sexual reproduction the present species resembles *Achlya megasperma* in the size and structure of the oogonia, eggs and antheridia, but differs in usually having coiled oogonial stalks and androgynous antheridia.

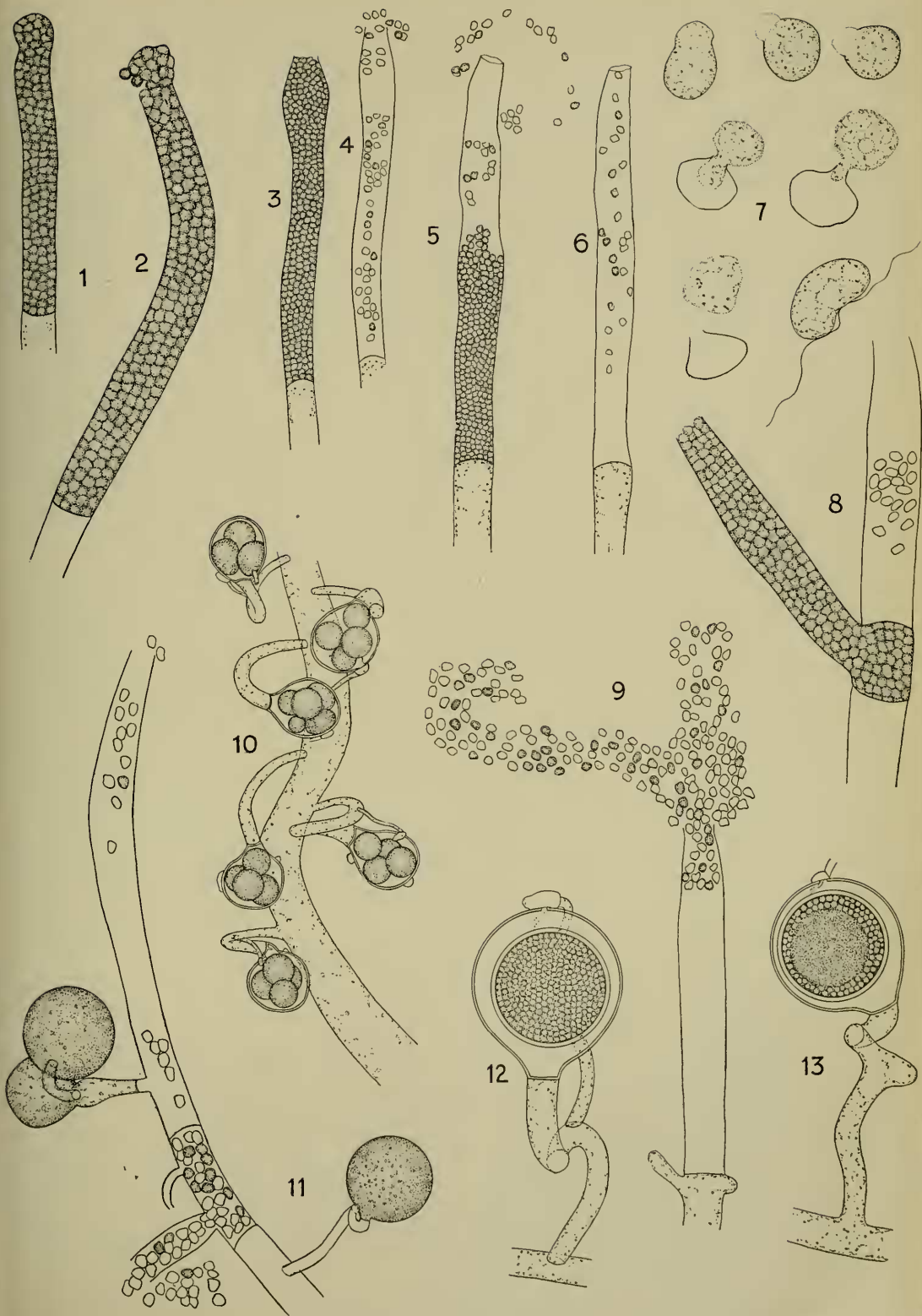
The sporangia of *T. achlyoides* usually begin to appear about 36 hours after inoculation and if the food supply is ample they continue to be formed for two weeks or not rarely longer. The following observation was made on a culture March 24 on a small piece of lima bean in sterile well water. When examined March 27th many sporangia were discharging spores. On April 17th there were many empty sporangia with spores and empty cysts spread out on the bottom of the dish; no sporangia were seen emptying at this time though watched for fifteen minutes; a good many sporangia were apparently in a resting condition, a few with tips broken off and others without broken tips. Fresh water was added and the spores in the sporangia with broken tips began to emerge shortly; the other sporangia also soon discharging their spores as usual. These observations have been repeated several times with similar results.

The oogonia, as has been mentioned above, have been formed rarely in our cultures and then occurred on pieces of boiled corn grain in sterile well water about two weeks after inoculation. Various media have been employed to induce the formation of sexual organs, including 0.05% haemoglobin plus a trace of levulose; equal parts of 0.05% haemoglobin and 0.05% leucin; equal parts 0.05% leucin and 0.05% levulose; and 0.1% levulose; but all without success.

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#### EXPLANATION OF PLATE 8

- Fig. 1. A sporangium with swollen apex just before breaking.  
 Fig. 2. Sporangium just after the apical swelling has cracked on one side.  
 Fig. 3. Sporangium after complete separation of the tip area with its included spores. A second swelling is shown that will lead to the expulsion of the next lower group of spores.  
 Fig. 5. Sporangium about half emptied.  
 Figs. 4, 6. Sporangia at the end of their activity, but shown, as always, with some loosely arranged spores still included. Most of these have left their cysts and escaped by swimming through the apex. Fig. 4 shows the same sporangium as fig. 3, and fig. 6 the same as fig. 5.  
 Fig. 7. Spores emerging from their angular cysts; one spore has taken its final shape and shows the cilia.



THRAUSTOTHECA ACHLYOIDES